National Institute of Environmental Health Sciences

# Ecological consequences of body size decline in harvested fish species: Positive feedback loops in trophic interactions amplify human impact

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**Year:** 2013
**Journal:** Biology Letters. 9 (2): 20121103

**Abstract:**

Humans are changing marine ecosystems worldwide, both directly through fishing and indirectly through climate change. One of the little explored outcomes of human-induced change involves the decreasing body sizes of fishes. We use a marine ecosystem model to explore how a slow (less than 0.1% per year) decrease in the length of five harvested species could affect species interactions, biomasses and yields. We find that even small decreases in fish sizes are amplified by positive feedback loops in the ecosystem and can lead to major changes in natural mortality. For some species, a total of 4 per cent decrease in length-at-age over 50 years resulted in 50 per cent increase in predation mortality. However, the magnitude and direction in predation mortality changes differed among species and one shrinking species even experienced reduced predation pressure. Nevertheless, 50 years of gradual decrease in body size resulted in 1-35% decrease in biomasses and catches of all shrinking species. Therefore, fisheries management practices that ignore contemporary life-history changes are likely to overestimate long-term yields and can lead to overfishing.

**Source:** http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3639762

## Resource Description

**Exposure :**

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Food/Water Security

**Food/Water Security:** Fisheries

**Geographic Feature:**

resource focuses on specific type of geography

Ocean/Coastal

**Geographic Location:**

resource focuses on specific location

Non-United States

**Non-United States:** Australasia

**Health Impact:** ☑

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

**Model/Methodology:** ☑

type of model used or methodology development is a focus of resource

Exposure Change Prediction, Other Projection Model/Methodology

**Other Projection Model/Methodology:** Fishery/Ecosystem Model

**Resource Type:** ☑

format or standard characteristic of resource

Research Article

**Timescale:** ☑

time period studied

Long-Term (>50 years)